FOREST PEST MANAGEMENT
Pacific Southwest Region

82 1532

Report No. 82-11

3430 Evaluation
April 19, 1982

AN EVALUATION OF OAK MORTALITY AT ISLAND PARK RECREATION AREA, PINE FLAT LAKE, U.S. ARMY CORPS OF ENGINEERS

Gregg De Nitto, Plant Pathologist
John Dale, Entomologist

PSW FOREST AND RANGE EXPERIMENT STATION
APR 29 1982
STATION LIBRARY COPY

ABSTRACT

Mortality of blue oaks at Island Park Recreation Area has been occurring for several years, removing most of the tree cover in parts of the campground. Examination of the area indicates that decline and mortality is a result of a combination of abiotic stress factors, including heavy usage and attendant soil compaction, shallow soil, lower than average precipitation, abuse of trees by recreationists, loss of a litter layer, and a fluctuating water table. This has caused rootlet mortality and chronic water stress from which the trees have not been able to recover. A series of alternatives is discussed that would have a variety of effects on the condition of the existing vegetation, as well as on the rehabilitation and revegetation of the campground.

INTRODUCTION

At the request of Colonel Paul F. Kavanaugh, District Engineer, Sacramento District, the Forest Pest Management staff, Forest Service, conducted a biological evaluation of oak mortality at Pine Flat Lake.

On February 22, 1982, we met with Doug Saul from the Pine Flat office, U.S. Army Corps of Engineers, and visited the Island Park Recreation Area on the north shore of Pine Flat Lake. Mortality and decline of blue oaks has been noted over the past several years and is of increasing concern. We examined the vegetation on all sites and surrounding areas on February 23 and 24.

This campground of 42 units is located on Pine Flat Lake east of Fresno, California. Recreation use is heavy, principally during the summer months to support water sports. Parts of the campground may be flooded in the spring of certain years for a few weeks. The tree cover is dominated by blue oak, although a few exotic species have been planted around the facilities. A few shrub-like interior live oak are located in the area. Understory vegetation is limited to grasses and a few scattered manzanitas and honeysuckles. Vegetation is absent on each site within 12 to 18 feet of the picnic table-firepit. This is a result of an active program of eliminating flammable materials with herbicides, as well as the effects of frequent usage.

Environmental conditions are typical of low-elevation Sierra foothills, with moist winters of moderate temperatures and hot, dry summers. Precipitation occurs as rain principally between October and April with an annual average of approximately 20 inches. Significant declines in precipitation occurred recently during the 1975-1977 drought and in 1971 and 1972. The soil is a relatively shallow, well-drained sandy loam that overlies decomposing granite and granite bedrock.

Symptoms of declining vigor appear gradually throughout the crown with branch tip dieback. Branch dieback becomes more extensive with time, and auxiliary buds begin sprouting on the bole and main branches. Within two to three years of initial symptoms, trees begin to die.

Mortality is present throughout the campground with the majority concentrated in and around the northern loop. This northern loop is the area that has had the longest period of recreational use. The mortality in the southern loop is near the top of the knoll and is situated on a rock outcrop with shallow soil. Mortality in the northern loop is more substantial and is resulting in the loss of most of the tree cover in this area. The mortality in this area follows the high water line, but also can be found up the slope. Locations of significant mortality are outlined on the enclosed map.

DIAGNOSIS/DISCUSSION

Our investigation did not reveal any definitive causal agent involved in tree mortality. Biotic agents that could be primary factors were not found; some weakly pathogenic fungi may be invading severely stressed branch tissue and accelerating branch mortality slightly. However, even if these organisms did not invade branch tissue, tree mortality would likely occur.

Tree mortality is probably a function of the interaction of several environmental and site conditions that stress the trees beyond their ability to recover. This would include soil compaction, lower than average precipitation, shallow soils, loss of a litter layer, fluctuating water level, abuse of trees by recreationists, heavy usage, and

herbicide treatment. Some of these conditions would not impact the trees as adversely under natural conditions (as evidenced in areas surrounding the campground that are adequately supporting similar vegetation). But the influence of man-related factors apparently is providing additional stresses resulting in mortality.

The existence of the recreation area and the quantity of human traffic apparently is having a primary role in the decline of the blue oaks. These trees had grown for many years undisturbed, allowing them to modify their root system structure and size and crown size to exist within the limiting factors. At first, the site was used as a picnic area. Later, when it became a campground, soil and water conditions were altered. With time, these conditions became more severe as usage increased and site conditions deteriorated. These alterations have adversely affected the blue oaks, a relatively shallow-rooted species incapable of tolerating chronic water stress situations. Within the past several years, crown symptoms and mortality have increased, possibly accelerated and accentuated by the 1975-77 drought.

MANAGEMENT ALTERNATIVES

The following is a spectrum of alternatives that could be adopted at the recreation area. Differing results will be obtained depending on which alternative is selected. The alternatives would produce a range of diverse results and are concerned with the vegetation and recreation environment. They do not address other problems or constraints, such as public concerns, monetary limitations, or aesthetic qualities. These are subjects for consideration by the recreation manager, based on his/her goals and objectives.

1. Do Nothing. Present management practices would be followed with no new strategies adopted. Tree mortality would continue in the campground at levels probably comparable to the recent past or slightly lower as competition is reduced and if precipitation increases.

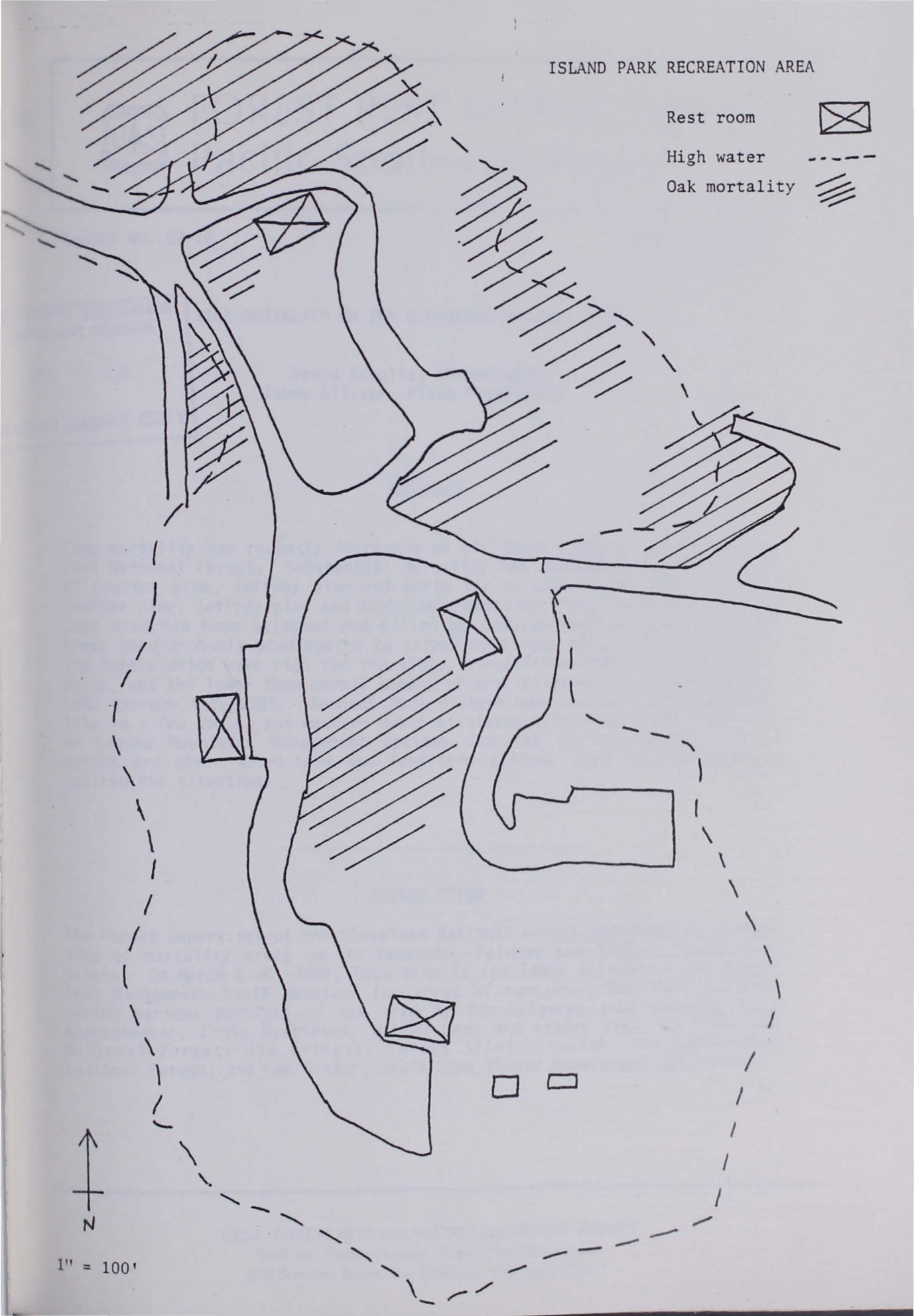
2. Site Rehabilitation. Attempts would be made to maintain trees that are in reasonably good condition. Dead and severely weakened trees (branch dieback throughout the crown) would be removed. Selected remaining trees could be lightly pruned (10-15% of their crown) to reduce their crown size and lessen the transpirational surface. The trees would be aided by fertilization with a balanced-nutrient fertilizer, whether by deep injection, placement in the soil, or injection into individual trees. Also, watering these trees in the summer would be beneficial if done regularly to moisten the top 2-3 inches of soil. Soil aeration, at least of the surface, by some mechanical method would permit improved air exchange as well as better moisture infiltration. Incorporation of an organic mulching compound into the upper soil profile would improve soil aeration, moisture-holding capacity, and nutrient status. Attempts at directing traffic to certain areas and away from trees could be made by the use of artifical and natural barriers that would be neither obtrusive nor degrading to the qualities of the area.

3. Regeneration. Because of the loss of a sizeable number of trees, replacements would have to be planted to return shade to the camping units. Some site rehabilitation, as mentioned in alternative 2, should be performed to assure a chance of survival for newly planted individuals. Selection of species to plant depends on the investment that would be made, as well as the desired result. The widest latitude of species could be selected if a permanent irrigation system existed throughout the area. Over- or under-irrigation could become a problem, if monitoring were inadequate.

Many species adapted to Mediterranean-type climates could be planted, and faster-growing species could be selected. However, native species should not be discouraged, since they are adapted to the site and climatic conditions. Species other than blue oak could be planted to provide diversity, including Digger pine (Pinus sabiniana) and interior live oak (Quercus wislizenii). The evergreen nature of both of these latter two species could be detrimental to the soil-water relations, since transpiration would continue year round and the trees would not shut down completely by losing their leaves prematurely during droughty years. Other coniferous species that might be considered include knobcone pine (P. attenuata), Coulter pine (P. coulteri), bigcone Douglas-fir (Pseudotsuga macrocarpa), Arizona cypress (Cupressus arizonica), Italian cypress (C. sempervirens), and Piute cypress (C. arizonica var. nevadensis). Hardwood species other than oaks are more limited, and drought-tolerant species or varieties should be selected (e.g., glossy privet (Ligustrum lucidum), olive (Olea europaea), fig (Ficus sp.)).

Trees selected for planting should have well-developed root systems and be of reasonable size. Container-grown plants would be the most satisfactory. Traffic should be directed away from the newly planted individuals at least for the first growing season. This could require closure of certain units. If permanent irrigation is not installed, the trees would have a better chance of survival if periodically watered during at least the first growing season.

4. Campground Closure. This is the most drastic of the alternatives. Closing part or all of the recreation area would reduce the stress on the trees, with the result of reducing the amount of mortality. Some type of site rehabilitation should also be considered during the closure. To be effective, a short-term closure would be inadequate; several years would be necessary for the site and vegetation to begin to recover. However, during any regeneration attempts specific sites could be closed to reduce traffic. Rotating closure of sites periodically might also be beneficial.


ISLAND PARK RECREATION AREA
Rest room
High water
Oak mortality
N
1" = 100'